Model Question Paper-2011
Second Semester B.Sc. Mathematics
MM2B02: Informatics and Mathematical Softwares

Time: 3 hours Max. Weightage:30

I. **Objective type questions:-**
Answer all 12 questions($12 \times \frac{1}{4} = 3$ **weightage)**

1. CPU is C_____ P_____ U_____
2. _____ is a software which makes the hardware resources available to the user.
3. The `type(x)` command is used to find the _____ of the variable x.
4. Python output for `>>> 2 * 2 != 4` is _____
5. Python output for `>>> '2' * 3` is _____
6. Python uses _____ to delimit blocks of code.
7. The _____ command in the Matplotlib package is used to have multiple plots in the same window.
8. The _____ function in numpy module can be used to convert a list to an array.
9. In LaTeX, in-line equations are entered between two _____ symbols.
10. The extension of a LaTeX file is _____
11. The LaTeX command for $\sqrt{x + \sqrt{y}}$ is _____
12. The output of `$ \sqrt{ \cos^2x + \sin^2x } = r $` in LaTeX is _____

II. **Short Answer type questions:-**
Answer all 9 questions ($9 \times 1 = 9$ **weightage)**

13. What is dynamic data typing ?
14. Explain the difference between break and continue statements. Give examples.
15. Write the output of the following Python commands.

```
a = 'hello world'
print a[3:5]
print a[:-2]
print a[:]
```

16. Write the use of copy module with an example.

17. What is recursion? Write a Python function to calculate the GCD(Greatest Common Divisor) of two numbers.
18. What are the main document classes supported by LaTeX? Explain the difference between any two of them.
19. Write a vectorized function to evaluate $y = x^{10}$ and print the result for $x = [1, 2, 3]$.
20. Write the LaTeX commands to output

$$\int_0^\infty \frac{\sin x}{x} dx = \frac{\pi}{2}$$

21. Write the LaTeX command to get the following output:
Underlined, *emphasized* and **bold face** texts are possible in LaTeX.

III. **Short Essay or paragraph questions**
Answer any 5 questions from 7 ($5 \times 2 = 10$ **weightage)**

22. Write a Python program to create a new file named 'test.dat', write a string 'A test string' to it and close the file.
23. Match the following appropriately

LaTeX	—	Leslie Lamport
Python	—	Mutable
`>>>3 not in [2.2,3,12]`	—	False
`>>>2**2 == 4`	—	Guido van Rossum
List	—	True

24. Explain the terms module and package (in Python). Show by an example: What are the different ways of importing a function from a module?
25. Write codes of Python, using pylab, to solve the following equations using matrices

$$4x + y - 2z = 0$$
$$2x - 3y + 3z = 9$$
$$-6x - 2y + z = 0$$

26. Plot the following functions (all in the same window) over the interval [0,5] arranged at 0.2 step size.
    (a) $f(t) = t^2$ in green color and x- shaped line.
    (b) $f(t) = t^3$ in blue color and o- shaped line.
    (c) $f(t) = t^4$ in black color and solid line style
27. A circle with center as origin and radius r can be represented using the equations $x = r\cos\theta$ and $y = r\sin\theta$; $0 \leq \theta < 2\pi$. Write the Python commands to plot the circle $x^2 + y^2 = 400$.

28. Write the LaTeX codes for the following output

$$\begin{pmatrix} 1 & 2 & \cdots & n \\ 1^2 & 2^2 & \cdots & n^2 \\ \vdots & \vdots & \ddots & \vdots \\ 1^n & 2^n & \cdots & n^n \end{pmatrix}$$

IV. **Essay questions.**
Answer 2 questions from 3 ($2 \times 4 = 8$ weightage)

29. What is Python? What are the features of Python?
30. Write a Python programme to create a list containing first 100 prime numbers.
31. How does LaTeX differ from other word processor programs? Create a LaTeX document which produces the following output:

Sample Question Paper for
LaTeX & Python

Duration: 3 Hours **30 weightage**

1 Answer all Questions. $4 \times 1\frac{1}{2}$

1. How to insert comments while writing LaTeX and Python commands.
2. What is pickle package?
3. How \$, #, { symbols and Greek letters like α, β, δ are displayed in LaTeX?
4. Write a Python code to print all perfect cubes up to 2000 and write it to a file named 'cubes.dat'.
5. What is the way to get help on a built-in function inside python.

2 Answer any three Questions. 3×5

1. Write the code to find the product of 2 polynomials $3x^2 + 4x + 7$ and $6x + 7$, and evaluate that at $x = 3$.
2. How to use try and except keywords in python?
3. Write a note on 'indentation and colon in python'.
4. How to number an equation in LaTeX?

P.T.O.

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